

Quirky Rice May Speed Breeding of Improved Varieties

The accidental discovery of a quirk in a variety of Chinese rice called Zhongxin No. 1 may be a boon to breeders of this crop. The finding may help them produce new and better rice varieties in 5 years instead of the usual 10 or more, says Richard R.-C. Wang of the ARS Forage and Range Research Laboratory in Logan, Utah.

Wang and colleague Xiaomei Li, formerly with Utah State University at Logan, are thought to be the first to uncover the oddity in rice. It's known as loss of heterozygosity, or LOH. It occurs when second-generation offspring show fewer gene combinations than might be expected.

A research geneticist, Wang uses rice as a model for finding important clues to the genetics of rangeland grasses, which are relatives of rice. Rice is simpler to investigate because it has fewer genes than many of its wildland cousins, such as crested wheatgrass, wild rye, or Indian ricegrass.

Wang and other scientists in the Forage and Range Research Laboratory investigate grasses and other hardy native and introduced plants that could be used in the West to stabilize erosion-prone slopes, revegetate areas denuded by wildfire, or provide nutritious, appetizing forage for livestock and wildlife.

Wang and Li examined the genetic makeup of hybrid plants made by colleague Jiansan Chen of the Chinese Academy of Agricultural Sciences in Beijing. While working as a visiting scientist at the Logan laboratory, Chen made the hybrids by pollinating Zhongxin No. 1 plants with pollen from U.S. rice plants.

The Logan scientists found that the genetic makeup of some of the second-generation hybrids remained fixed, or constant, in subsequent generations. "That occurred sooner than

expected," according to Wang. This speed is potentially valuable. Here's why: It often takes many years of plant breeding before combinations of valued traits, such as salt tolerance and improved pest resistance, for example, can become fixed in offspring of rice plant hybrids.

"When uniform second-generation plants show the traits breeders want," explains Wang, "that means the laborious breeding process has likely been streamlined from many years to just a few. That's how loss of heterozygosity could turn out to be a valuable shortcut for breeding new rice. Having a valued trait fixed into the plant's genetic makeup early in the breeding process is a big savings of time and money."

LOH plants have fewer versions of genes from both parents than typical, or heterogenic, offspring. The numerous combinations of genes that normally result in heterogenic offspring can complicate breeding.

LOH, in contrast, results in a narrower range of combinations, so it can vastly simplify the breeding process.

"We don't know what controls this genetic mechanism," notes Wang, "but we hope to find out so that we can put it to work in breeding new plants for the future."—By **Marcia Wood, ARS.**

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